Reduce 17 : 9 ½ to a Decimal?

s d
17 : 9 ½

.85
.039
.889 Answer

Reduce £ s d 4 : 15 : 4 ¼ to a Decimal?

£ s d
4 : 15 : 4 ¼

4.75
.017
4.767 Answer

Reduce £ s d 7 : 13 : 11 ½ to a Decimal?

7.65
.047
7.697 Answer

3

To find the Value of a Decimal in the known Parts of Money Weight Time Measure &c.

Rule

Multiply the given Decimal by the Num= of Parts of the next inferior Denomination & from the product prick off towards the right hand so many places as are in the given Decimal. Then multiply the figures pricked off by the Number of parts of the next inferior De= =nomination & prick off so many places as before. And so continue the work till you have brought it to the low= =est Denomination required.

What's the Value of .75 of a Pound?

£
.75
20
s. 15.00

What's the Value of .862 of a Pound

£
.862
20
s 17.240
12
d 2.880
4
q 3.520

What's the Value of .9647 of a Pound?

£
.9647
20
s 19.2940
12
d 3.5280
4
q 2.1120

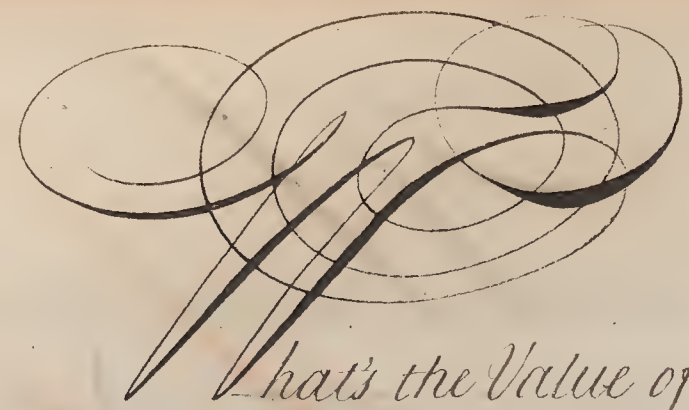
What's the Value of .4768 of a ℔ Troy?

℔
4768
12
℥ 5.7216
20
Pen: Wt 14.4320
24
17280
8640
Gr. 10.3680

What's the Value of .7691 of a Ton Averdupoise Weight?

Ton
.7691
20
£ 15.3820
4
Qr 1.5280
28
42240
10560
lb 14.7840
16
Oz 12.5440
16
Dr. 8.7040

16	4	8.7040
	4	2.1760
16	4	12.5440
	4	3.1360
28	4	14.7840
	7	3.6960
	4	1.5280
	20	15.3820
		.7691



What's the Value of .5867 of a Hundred?

£
.5867
4
Qr 2.3468
28
27744
6936
lb 9.7104
16
Oz 11.3664
16
Dr 5.8624

16	4	5.8624
	4	1.4656
16	4	11.3664
	4	2.8416
28	4	9.7104
	7	2.4276
	4	2.3468
		.5867

A Compendious Way to find the Value of the Decimal of a Pound Sterling by Inspection.

Double the first Figure or place of primes & set it for Shillings if the next figure of place of Seconds be 5 or more than 5 for this add 1 to the former Shillings: Then for every Unite in the 2.nd place suppose 'em as tens set before the 3rd place reckon these as far: but if they make above 13 abate 1 or 2 if above 38. & these farthings when reduced to pence must be added to the Shilling before found.

What's the Value of .471 of a £?

Answer $\overset{s}{9}, \overset{d}{5}$

.45
.021
.471 Proof

What's the Value of .278 of a Pound?

Answer $\overset{s}{5}, \overset{d}{6}\ \frac{3}{4}$

.25
.028
.278 Proof

What's the Value of .916 of a Pound?

Answer s 18 d 3 3/4

.9
.015
.915 Proof

What's the Value of .071 of a Pound?

Answer s 1 5

.05
.021
.071 Proof

What's the Value of .009 of a £?

Answer d 2 1/4

.009 Proof

What's the Value of .002 of a Pound?

Answer d 2

.002 Proof

The Rule of Three Direct.

Is stated and worked as in Vulgar Arithmetick only instead of preparing your Numbers by reducing them into their lowest Denominations You must bring their Fractional parts into Decimals.

If 26½ Yards of Sattin cost £ 3 : 16 : 3 s d What will 32¼ Yards cost at that Rate?

Yds £ s d Yds

26¼ : 3 : 16 : 3 : : 32¼.

4 | 1.00 — 26.25

12 | 3.00 — 20 | 16.25 — 3.8125

4 | 1.00 — 32.25

32.25

19 0625

76250

76250

11 4375

26.25) 122.953125 (4.6839

10500

17953

15750

22031

£ 4.6839 × 20 = s 13.6780 × 12 = d 8.1360

22031

21000

10312

7875

24375

23625

750

Yds £ s d Yds

32¼ :: 4 : 13 : 8.1360 $\frac{000750}{26.25}$ :: 26¼

4 | 1.00 — 32.25

12 | 8.1360 — 20 | 13.6700 — 4.6839

26.25

234195
93678
281034
93678750

32.25) 122.953125 (3.8125 £

9675
26203
25800
4031
3225
8062
6450
16125
16125

20 s — 16.2500

12 d — 3.0000

At $\overset{s}{17}\cdot\overset{d}{6}\frac{3}{4}$ ℔ Yard what will $\overset{Yds}{57}\frac{3}{4}$ cost?

Yard s d Yards

1 : 17 : $6\frac{3}{4}$ :: $57\frac{3}{4}$

4	3.00	4	3.00
12	6.75		57.75
20	17.5625		

.878125
57.75
4390625
6146875
6146875
4390625

£ 50.71171875
20
s 14.23437500
12
d 2.81250000
4
q 3.25000000
4
.00000000

Yds £ s d q Yd

57¾ : 50 : 14 : 2 : 3¾ :: 1

4 | 3.00
57.75

4 | 1.00
4 | 3.25
12 | 2.8125
20 | 14.234375
57.75) 50.711171875 (.878125
46200
45117
40425
46921
46200
7218
5775
14437
11550
28875
28875

20
£17.562500
12
d6.750000
4
q3.000000

If 671⅛ Ells of any thing cost £ 297 : 11 : 7¼ s d
What's that ℔ Ell?

Ells £ s d Ell
671⅛ : 297 : 11 : 7¼ : : 1

8 | 1.000
671.125

4 | 1.00
12 | 7.25
20 | 11.604166

671.125) 297.580208 3 (.4434
2684500
2913020
2684500
2285208
2013375
2718333
2684500
33833

20
s 8.8680
d 12
10.4160
4
11.6640

Ell s d q Ells

1 : 8 ÷ 10 ÷ 1.6640 $\frac{.00338 33}{671.125}$ :: 671 $\frac{1}{8}$

4 | 1.6640
12 | 10.4160
20 | 8.8680
.4434
671.125
22170
8868
4434
4434
31038
£ 2660433833
297.5802083
20
s 11.6041660
12
d 7.2499920
4
9999680

8 | 1.000
671.125

The Indirect Rule of Three.

Is performed the same as in vulgar Arithmetick after the Numbers are prepared as taught in Decimals.

If when the Bushell of Weight is $6^{s}\ 8^{d}$ a penny Loaf weighs $5\frac{1}{2}$ Ounces, What will it weigh when Wheat is 10^{s} ℔ Bushel?

$^{s}\ ^{d}\quad Oz\quad ^{s}$

$6.8 : 5\frac{1}{2} :: 10$

12 | 8.00 — 2 | 1.0 — 2/0 | 10

2/0 | 6.6666 — 5.5 — .5

.33333

55

166665

166665

.5 | 1.833315

$Oz\ 3.666663$

$Dr.\ 10.666608$

l oz dr s d
10 : 3 : 10.66608 :: 6 : 8

2/0 | 10 | 10.66608 | 12 | 8.00
.5 | 16 | 2.66652 | 2/0 | 6.6666
3.66663 | .33333
.5
oz
33333 | 1.83331 5 | 5.5
166665
166665
166665

Work this Question pertaining to the Compound or Double Rule of three Direct & Indirect.

The Carriage of 3¾ Weight 150½ Miles comes to £1:11:6 What must I give for the Carriage of 8½ Weight 52¾ Miles at that Rate?

Cwt	Miles	£ s d
3¾	150½	1:11:6
8½	50½	*

4|3.00
3.75

2|1.0
8½

150.5
3.75
5725
10535
4515
564.375

2|1.0
150.5

1.0
52.5

12|6.0
20|11.5
1.575
8.5
7875
12600
133875
52.5
669375
267750
669375
564.375)70284375(1.24
564375
1384687
1128750
2559375
2257500
301875

£
s 20 / 4.80
d 12 / 9.60
4 / 9.240

£	Miles	£ s d q
$8\frac{1}{2}$	$52\frac{1}{2}$	1 : 4 : 9 : 2.40 $\frac{301875}{564375}$
$3\frac{3}{4}$	$150\frac{1}{2}$	*

2 | 1.0
8.5

2 | 1.0
52.5

4 | 2.40
12 | 9.60
20 | 4.80
1.24

4 | 3.00
3.75

2 | 1.0
150.5
3.75
7525
10535
4515
564.375
1.24
2257500
6772500
301875

52.5
8.5
2625
4200
446.25

£
446.25) 702.84375 (1.575
44625
256593
223125
334687
312375
223125
223125

20
s 11.500
12
d 6.000

What will 7368 : 3 : 14 of any thing come to at 1 : 12 : 6 ℔?

7368 : 3 : 14 at 1 : 12 : 6 ℔?

4	14.00
7	3.50
4	3.50

7368.875
1.625
36844375
14737750
14213250
7368875
£ 11974.421875
20
s 8.437500
12
d 5.250000
4
q 1.000000

12	6.00
20	2.50
	1.625

Interest

The annual Rent of any Sum of Money is found by multiplying the given principal by the Interest of 1 pound for a Year, which is found by dividing the Rate of Interest ℔ 100.

Example

What's a Year's Interest of £ 782 : 14 : 6 at 4 ℔ Cent: ℔ annum?

£ 782 : 14 : 6

12 | 6.00
| 14.50

782.725

.04

£ 31.30900

20

s 6.18000

12

d 2.16000

4

.64000

100 | 1.00
.04

What's the Interest of £67 at 5 ℔ cent ℔ An-
-num, for 2 Years?

£
67
.05
£ 43.35
20
$ 7.00

100 | 5.00
.05

£ s
43 ' 7
2
86 ' 14 answer

What's the Interest of £ s d 520 : 11 : 9½ for 5½ Years at £6 ₰Cent ₰annum?

£ s d
520 : 11 : 9½

1	2.0	100	6.00
12	9.5		.06
20	11.7916		

520.58958
.06
£ 31.23537748
20
s 4.70714960
12
D 8.48599520
4
q 1.94398080

£ s D q
31 : 4 : 8 : 1.94398080 5½
156 : 3 : 6 : 1.79904
15 : 12 : 4 : 0.97990 4
171 : 15 : 10 : 2.77894 4

What's the Interest of £1000 for 14¾ Years at £6 ℔Cent: ℔Annum?

£
1000
.06
60.00

100 | £ 6.00
.06

14.75
60
£ 885.00

What Interest will £621 amount to in 120 Days at £5 per cent per annum?

.0001643835 6
621
0001643835 6
0003287671 2
0009863013 6
00.1020821907 6
120
£12.2498628912 0
20
$4.9972578240 0
12
d11.9670938880 0
4
1 3.8683755520 0

What's the Interest of £560 for 60 Days at 5 ℔ Cent. ℔ annum?

.0001369863 0
60
0.0082191780 0
560
0049315068000
41095890000
£ 4.6027396800 0
20
s 12.0547936000 0
12
d 0.6575232000 0
4
q 2.6300928000 0

The Interest of £1 for 1 Day is thus found the given Rate or Interest of £100 for a Year being divided ℔100 quotes the Interest of £1 for a Year; which again divided ℔365 gives the required Interest of £1 for 1 Day; which when Multiplyed into both the Number of Days & the principal Sum produces the Interest for time required.

£

1|00|1.00

365)·01000·0000000(.00002739726

730

2700

2555

1450

1095

3550

3285

2650

2555

950

730

2200

2196

10

The Interest 1 £ for 1 Day.

at	1	℔Cent: is .00002739726
	2	.00005479452
	3	.00008219178
	4	.00010958904
	5	.00013698630
	6	.00016438356
	7	.00019178082
	8	.00021917808
	9	.00024657534
	10	.00027397260

Compound Interest

First

To find the Amount of any Sum at any Rate of Compound Interest for any Number of Years.

Rule

Multiply the Rate that is the Amount of £1 for 1 Year (which at 6 ℔ Cent is 1.06 at £5 ℔ Cent is 1.05£.) so often into itself as are the Number of years propos'd, wanting one, and the last Product multiplyed by the principle will give the amount required.

What's the Amount of £500 for/born 4 Years at £4 ℔ Cent: ℔ Annum Compound Interest?

1.04
1.04
416
1040
1.0816
1.04
43264
108160
1.124864
500
£584.92928000
20
s 18.58560
12
d 6.02720
4
.10880

Second

To find the Amount of any Annuity or Yearly Pension, forborn any Number of Years whatsoever at any Rate of Compound Interest.

Rule

Multiply the first Yearly Payment by the Rate & to the Product add the Second Yearly Payment the Sum is the Amount in 2 Years which multiplyed again by the Rate, the product with the Addition of the third yearly Payment is the Amount for 3 Years. &c.

What will a Pension of 30 £ ℔ Annum amount to being forborn 4 Years at 5 ℔ Cent: ℔ Annum Compound Interest?

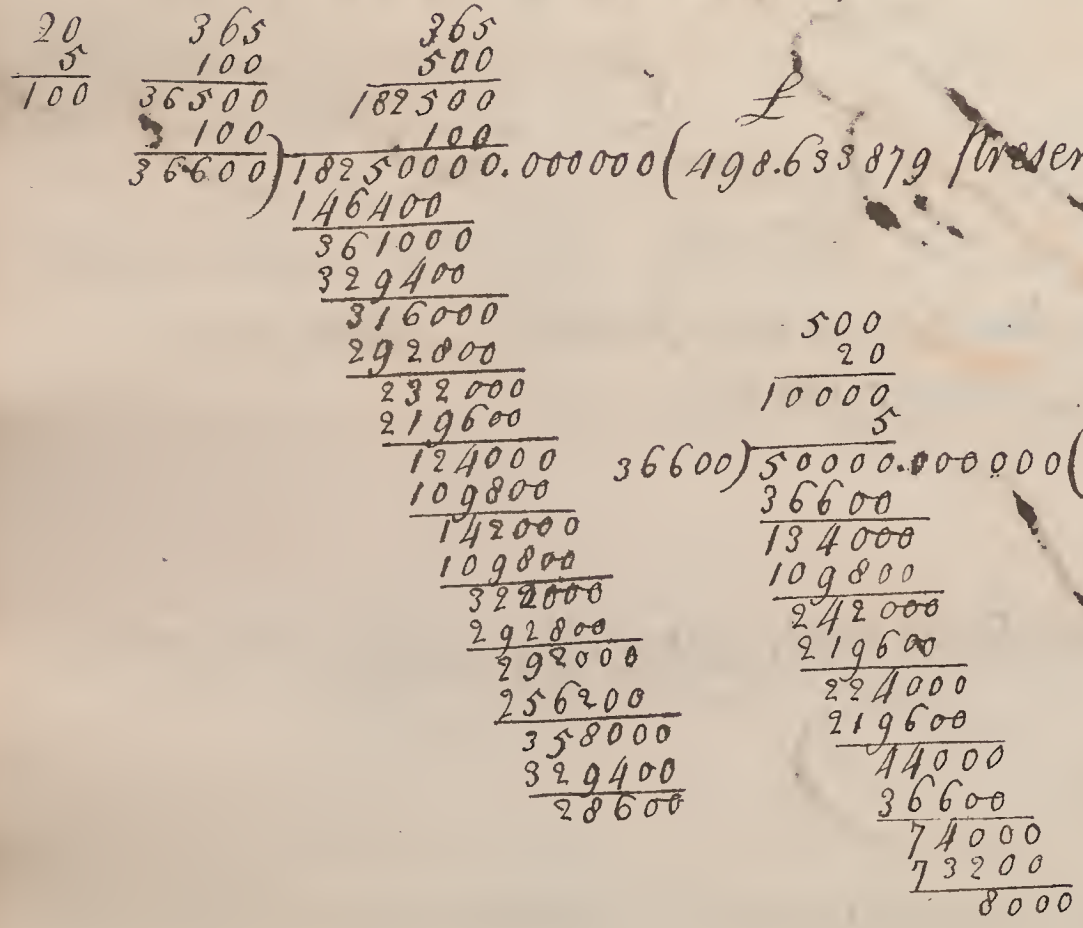
£
30
1.05
150
300
31.50
30.0
61.50
1.05
30750
61500
64.5750
30.
94.5750
1.05
472875
945750
99.303750
30.
£ 129.303750
20
6.075000
12
.900000
4
3.600000

Discount

Being fully explained under under this head in whole Numbers I shall immediately proceed to Examples.

The Rule is the same as in whole Numbers.

What Discount must be allow'd on a Bill of £500 paid 20 Days before 'tis due. Rebate at £5 ℔ Cent: ℔ Annum? and what present Money must be paid?


20 365 365
5 100 500
100 36500 182500
100 100
36600) 182500000.000000 (£ 498.633879 Present Worth
146400
361000
329400
316000
292000
232000
219600
124000
109800
142000
109800
322000
292800
292000
256200
358000
329400
28600
500
20
10000
5
36600) 500000.000000 (£ 13.661 20 Discount
36600
134000
109800
242000
219600
224000
219600
44000
36600
74000
73200
8000

Or for the present Worth, Multiply the Days in a Year, the Principal given, & £100 into each other for a Dividend; & add the product of 365 & £100 to that of the Days multiplyed into the Rate given for a Divisor, & the Quotient resulting is the Answer.

nd for the Discompt, Multiply the Rate, Principal & Days given together for a Dividend; & proceeding as above for a Divisor the Quotient will be the Answer.

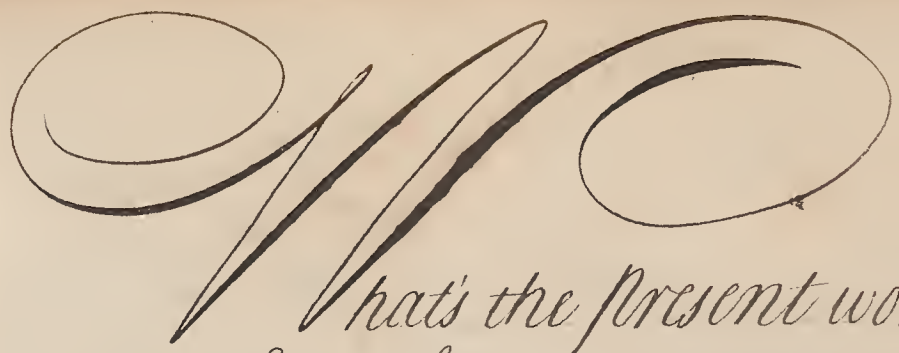
Rebate at Compound Interest

First

To find the present Worth of any Sum to be paid at any Number of Years to come. Rebate being made at any Rate of Compound Interest.

Rule

Divide the Principal continually so many times & the Rate as are the Number of Years proposed & the last Quotient is the Answer.



What's the present worth of £1 to be paid at the End of 6 Years Rebate being made at 6£ pcent: pannum Compound Interest?

1.06) 1.000000000 (1.06) .943396200 (1.06) .889996400 (1.06) .839619200

954 460 424 360 318 420 318 1020 954 660 636 240 212 28

848 953 848 1059 954 1056 954 1022 954 680 636 440 424 16

848 419 318 1019 954 656 636 204 106 980 954 260 212 48

1.06) .839619200 (1.06) .792093580 0 (1.06) .747258 9400 (Ans. .704960466

742 976 954 221 212 992 954 380 318 620 530 900 848 52

742 500 424 769 742 273 212 615 580 858 848 1000 954 460 424 36

742 525 424 1018 954 640 636 494 424 700 636 640 636 4

hats the present Worth of £480 to be paid at the End of 7 Years Rebate at £4.£5.£6.£7.£8.£9.£10 ℔Cent: ℔Annum Compound Interest?

1.04)1.000000000.00(1.04).961538460000(1.04).924556211000(

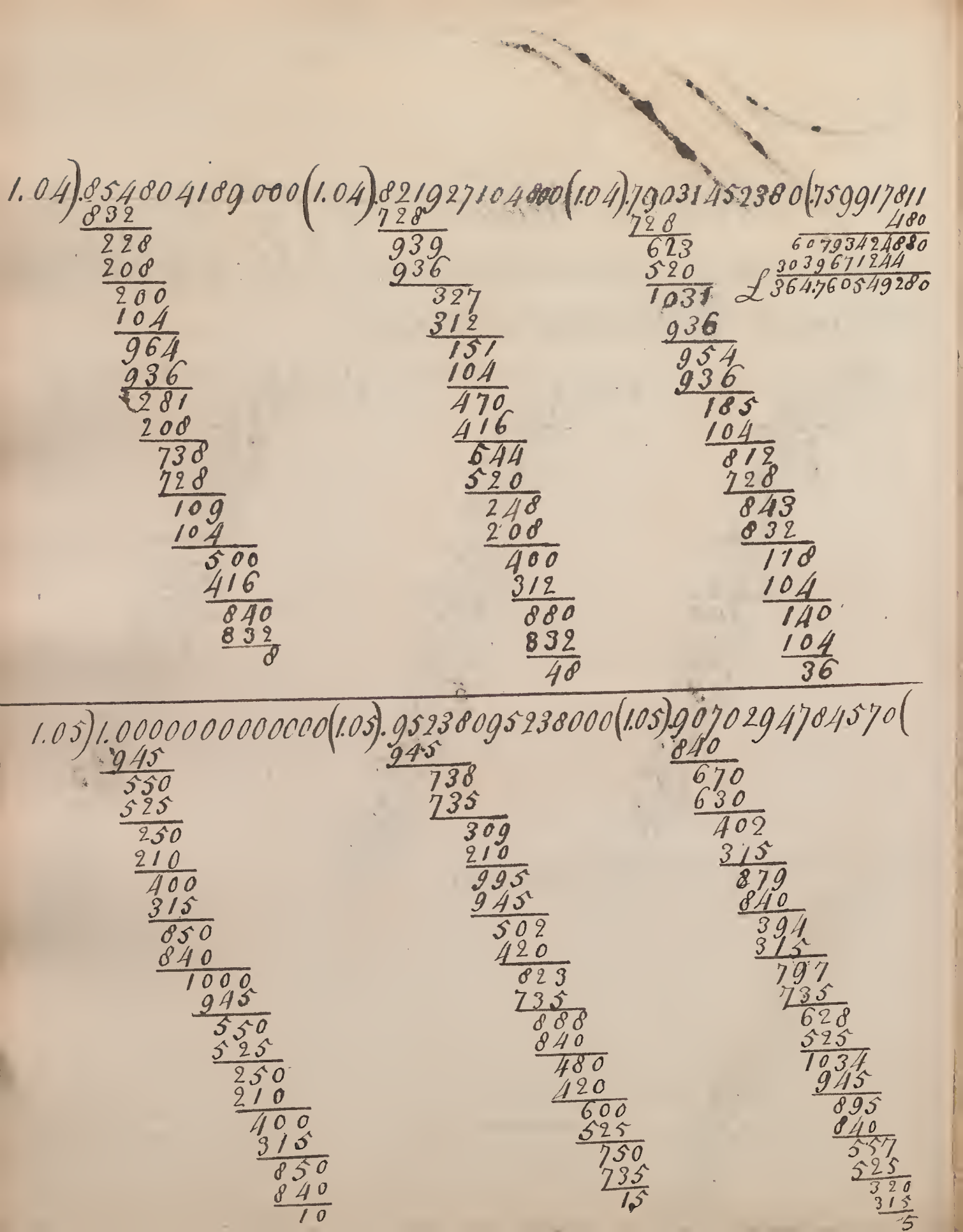
936
640
624
160
104
560
520
400
312
880
832
480
416
640
624
16

936
255
208
473
416
578
520
584
520
646
624
220
208
120
104
160
104
56

832
925
832
935
832
1036
936
1002
936
661
624
371
312
590
520
700
624
760
728
32

1.04).888996356 70(854804189

832
569
520
499
416
836
832
435
416
196
104
927
832
950
936


1.04).85480418900
832
228
208
200
104
964
936
281
208
738
728
109
104
500
416
840
832
8
(1.04).82192710480
728
939
936
327
312
151
104
470
416
544
520
248
208
400
312
880
832
48
(1.04).79031452380
728
623
520
1031
936
954
936
185
104
812
728
843
832
118
104
140
104
36
(.759917811
480
6079342880
3039671244
L364760549280
1.05)1.00000000000000
945
550
525
250
210
400
315
850
840
1000
945
550
525
250
210
400
315
850
840
10
(1.05).952380952380000
945
738
735
309
210
995
945
502
420
823
735
888
840
480
420
600
525
750
735
15
(1.05).907029478457O(
840
670
630
402
315
879
840
394
315
797
735
628
525
1034
945
895
840
557
525
320
315
5

1.05).863837598530 0(.822702474790 0(1.05).78352616646 2(

840
238
210
283
210
737
735
259
210
490
420
785
735
503
420
830
735
950
945
5

735
877
840
370
315
552
525
274
210
647
630
174
105
697
630
679
630
490
420
700
630
70

735
485
420
652
630
226
210
161
105
566
525
416
315
1014
945
696
630
660
630

1.05).74621539660000(.710681330095

480
568545064074 00
284272532038 0
£341.12703844540 0

1.06)1.000000000(.9433962

954
460
424
360
318
420
318
1020
954
660
636
240
212
28

735
112
105
715
630
853
840
139
105
346
315
316
315
1000
945
550
525
25

1.06).943396200(1.06).889996400(1.06).839619200(.79209358

848 — 848 — 742
953 — 419 — 976
818 — 318 — 954
1059 — 1019 — 221
954 — 954 — 212
1056 — 656 — 992
954 — 636 — 954
1022 — 204 — 380
954 — 106 — 318
680 — 980 — 620
636 — 954 — 530
440 — 260 — 900
424 — 212 — 848
16 — 48 — 52

1.06).792093580000(1.06).747258094400(1.06).704960466600(.66505704380

742 — 742 — 636
500 — 525 — 689
424 — 424 — 636
769 — 1018 — 536
742 — 954 — 530
273 — 640 — 604
212 — 636 — 530
615 — 494 — 746
530 — 424 — 742
858 — 700 — 460
848 — 636 — 424
1000 — 640 — 360
954 — 636 — 318
460 — 4 — 42
424
36

532045634400
266022817200
£319.227380640

1.07)1.0000000000(1.07).9345794390(1.07).8734387280(.8162978

963 370 321 490 428 620 535 850 749 1010 963 470 428 420 321 990 963 27

856 785 749 367 321 469 428 414 321 933 856 779 749 300 214 860 856 4

856 174 107 673 642 318 214 1047 963 842 749 938 856 820 749 710 642 68

1.07).8162978760(1.07).7628952110(1.07).7129861785(1.07).6663422228(

749 672 642 309 214 957 856 1018 963 557 535 226 214 120 107 130 107 23

749 138 107 319 214 1055 963 922 856 661 642 191 107 840 749 910 856 540 535 5

642 709 642 678 642 366 321 451 428 237 214 238 214 245 214 310 214 960 856 1040 963 77

642 243 214 294 214 802 749 532 428 1042 963 792 749 438 428 109 107 2

.62274974148

4981997928

249099896

£298.919875680

1.08)1.0000000000(1.08).925925200(1.08).857338800(1.08)3223

972
280
216
640
540
1000
972
280
216
640
540
1000
972
280
216
64

864
619
540
792
756
365
324
419
324
952
864
880
864
160
108
52

756
1013
972
413
324
898
864
348
324
241
216
250
216
340
324
16

1.08).7938322300(1.08).7350298400(1.08).6805831800(1.08).6301696100(5834903791.08

756
378
324
543
540
322
216
1063
972
910
864
460
432
28

648
870
864
629
540
898
864
344
324
200
108
920
864
56

648
325
324
183
108
751
648
1038
972
660
648
120
108
12

540
901
864
976
972
410
324
860
756
1040
972
68

46692303 20
2333961516
£2800753819 20

1.(1.09)1.0000000000(.09
981
190
109
810
763
470
436
340
327
230
109
210
109
1010
981
29

(1.09).9174311900(.09
872
454
436
183
109
741
654
871
763
1089
981
1080
981
990
981
9

(1.09).8416799900(.09
763
786
763
237
218
199
109
909
872
379
327
520
436
840
763
77

(1.09).7721834700(.09
763
918
872
463
436
274
218
567
545
120
118
2

(1.09).7084252000(.09
654
544
436
1082
981
1015
981
342
327
150
109
410
327
830
763
67

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545
1049
981
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654
291
218
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654
797
763
340
327
130
109
21

(1.09).5962673100(.09
545
512
436
766
763
373
327
461
436
250
218
320
218
1020
981
39

54763422
489
43762738320
2188136916
£26257672920

1.10	1.0000000000	0 (1
1.1	.90909090	9 (1
1.1	.82644628	0
1.1	.75131480	6
1.1	.68301340	0 (3
1.1	.62092127	0 (2
1.1	.56447388	0 (3
1.1	.51315807	0 (7
1.1	.46650733	0 (3
	.42409757	0 (6
	.38554324	

.51316807
480
4105264560
205263228
246.31587360

480
30843459 20
15421729 6
£ 185.06075520

			£
	4		364.76054928
	5		341.12703844 54
The Prest.	6	D. Cent. at the	319.22738064
Worth of	7	End of seven	298.91987568
480 £ at	8	Years is.	280.07538192
	9		262.57672992
	10		246.31587360

The principal £				Yr.
1.		.96153846		1
0.96153846	divided	.924556211	for	2
0.924556211	by the	.888996356	the	3
0.888996356	Rate	.854804189	pres.t	4
0.854804189	1.04	.821927104	Value	5
0.821927104	gives	.790314523	for	6
0.790314523		.759917811		7

The principal £				Yr
1		.9523809523		1
0.9523809523	divide	.907029478457	for	2
0.907029478457	by the	.863837598	the	3
0.863837598	Rate	.822702474	pres.t	4
0.822702474	1.05	.783526166	Value	5
0.783526166	gives	.746215396	for	6
0.746215396		.710681330		7

The principal £				Yr
1		.9433962		1
0.9433962	divided	.889996	for	2
0.889996	by the	.839619	the	3
0.839619	Rate	.792093	pres.t	4
0.792093	1.06	.747258	Value	5
0.747258	gives	.704960	for	6
0.704960		.665057		7

The principal £1

0.934579439	divided	.934579439		Yr 1
0.873438728	by the	.873438728	for	2
0.816297878	Rate	.816297876	the	3
0.762895211	1.07	.762895211	pres.t	4
0.712986785	gives	.712986785	Value	5
0.666342228		.666342228	for	6
		.622749741		7

The principal £1

0.925925 92	divided	.925925 92		Yr 1
0.85733881	by the	.85733881	for	2
0.79383223	Rate	.79383223	the	3
0.73502984	1.08	.73502984	pres.t	4
0.68058318	gives	.68058318	Value	5
0.63016961		.63016961	for	6
		.583490379		7

The principal £1

0.91743119	divided	.91743119		Yr 1
0.84167999	by the	.84167999	for	2
0.77218347	Rate	.77218347	the	3
0.7084252	1.09	.7084252	pres.t	4
0.64993137	gives	.64993137	Value	5
0.59626731		.59626731	for	6
		.54763422 9		7

The principal £1

0.909090909	divided	.909090909		Yr 1
0.826446 28	by the	.826446 28	for	2
0.751314 8	Rate	.751314 8	the	3
0.683013 4	1.10	.683013 4	pres.t	4
0.620921 27	gives	.620921 27	Value	5
0.564473 88		.564473 88	for	6
		.513158 07		7

Decimal Tables shewing

Table 1.st the Amt. of 1 £ for any No. of Yrs under 33 at the Rates of 5 & 6 pCent pAnnum Compound Interest.

Table 2.nd The Amount of 1 £ Annuity for any No. of Yrs under 33 at the Rates of 5 & 6 pCent. pAnnum Compound Interest.

Rates 5	Rates 6	Years	Rates 5	Rates 6
1.05000	1.06000	1	1.00000	1.00000
1.10250	1.12360	2	2.05000	2.06000
1.15762	1.19101	3	3.15250	3.18360
1.21550	1.26247	4	4.31012	4.37461
1.27628	1.33822	5	5.52563	5.63709
1.34009	1.41852	6	6.80191	6.97532
1.40710	1.50363	7	8.14200	8.39383
1.47745	1.59384	8	9.54910	9.89746
1.55132	1.68948	9	11.02656	11.49131
1.62889	1.79084	10	12.57789	13.18079
1.71034	1.89829	11	14.20678	14.97164
1.79585	2.01219	12	15.91712	16.86994
1.88565	2.13292	13	17.71298	18.88213
1.97993	2.26090	14	19.59863	21.01506
2.07892	2.39655	15	21.57856	23.27597
2.18287	2.54035	16	23.65749	25.67252
2.29201	2.69277	17	25.84036	28.21288
2.40662	2.85434	18	28.13238	30.90565
2.52695	3.02559	19	30.53900	33.75999
2.65329	3.20713	20	33.06595	36.78559
2.78596	3.39956	21	35.71925	39.99272
2.92526	3.60353	22	38.50521	43.39229
3.07152	3.81975	23	41.43047	46.99582
3.22510	4.04893	24	44.50199	50.81557
3.38635	4.29187	25	47.72709	54.86451
3.55567	4.54938	26	51.11345	59.15638
3.73345	4.82234	27	54.66912	63.70576
3.92013	5.11168	28	58.40258	68.52811
4.11613	5.41838	29	62.32271	73.63979
4.32194	5.74349	30	66.43884	79.05818
4.53804	6.08810	31	70.76079	84.80167
4.76494	6.45338	32	75.29883	90.88977

Decimal Tables

shewing

Table 3.rd the Pres.t Worth of 1 £ due at any N.o of Years to come under 33 Rebate at 5 & 6 P Cent: P Ann: Comp: Int:

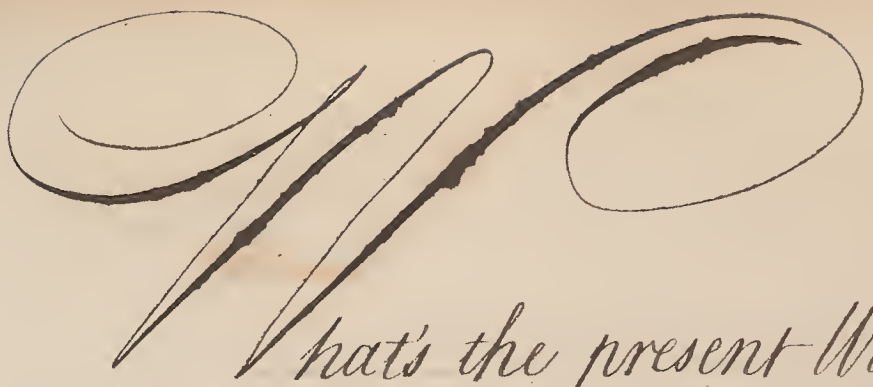
Table 4.th The pres.t Worth of 1 £ Annuity to continue any N.o of Years under 33 Rebate at 5 & 6 P Cent: P Annum Comp: Int:

Rates 5	Rates 6	Years	Rates 5	Rates 6
.952381	.943396	1	0.95238	0.94339
.907030	.889996	2	1.85941	1.83339
.863838	.839619	3	2.72324	2.67301
.822702	.792093	4	3.54595	3.46510
.783526	.747258	5	4.32947	4.21236
.746215	.704960	6	5.07569	4.91732
.710682	.665057	7	5.78637	5.58238
.676839	.627412	8	6.46321	6.20979
.644609	.591898	9	7.10782	6.80169
.613913	.558394	10	7.72173	7.36008
.584679	.526787	11	8.30641	7.88687
.556837	.496969	12	8.86325	8.38384
.530321	.468839	13	9.39357	8.85268
.505068	.442301	14	9.89864	9.29498
.481017	.417265	15	10.37965	9.71225
.458111	.393647	16	10.83777	10.10589
.436296	.371364	17	11.27406	10.47726
.415520	.350343	18	11.68958	10.82760
.395734	.330513	19	12.08532	11.15811
.376889	.311804	20	12.46221	11.46992
.358942	.294155	21	12.82115	11.76407
.341849	.277505	22	13.16300	12.04158
.325571	.261797	23	13.48857	12.30338
.310067	.246978	24	13.79864	12.55035
.295302	.232998	25	14.09394	12.78335
.281240	.219810	26	14.37518	13.00316
.267848	.207368	27	14.64303	13.21053
.255093	.195630	28	14.89812	13.40616
.242946	.184556	29	15.14107	13.59072
.231377	.174110	30	15.37245	13.76483
.220359	.164254	31	15.59281	13.92908
.209865	.154956	32	15.80267	14.08404

Second Rule

To find the present Worth of any Annuity or Yearly pension to continue any Number of Years: Rebate being made at any Rate ℔ cent. p annum compound Interest.

Find by the foregoing Rule the present Worth of the proposed Annuity for 1. 2. 3 or so many Years as are demanded, and the Sum of those respective present Worths will be the Value of the Annuity; that is, the first & Second of those Values added together, will be the present Worth for 2 Years; & the 1st 2nd 3d added together for 3 Years. &c.



What's the present Worth of an Annuity
of 70 £ to continue 5 Years Rebate at 5 ℔ Cent. p Ann.

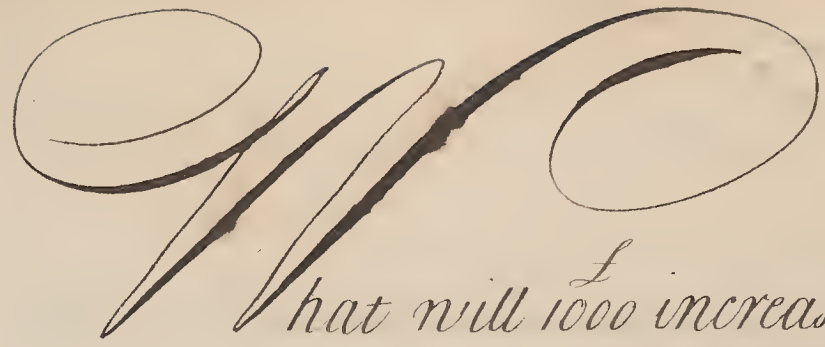
£ ·952380952380 70 = 66.666666666660
63.492063491990
60.468631897100
57.589173235300
54.846831652200
£ 303·063366943190 Answer.

£ ·907029478457 70 = 63492063491990

£ ·822702474790 70 = 57589173235300

£ ·863837598530 70 = 60468631897100

£ ·783526166460 70 = 54846831652200



What will £1000 increase to forborn 22 Years at £5 ₰ Cent: ₰ Annum Compound Interest?

£
1000
1.05
1050.00
1.05
5250
1050
1102.50
1.05
55125
11025
1157.625
1.05
5788125
1157625
1215.50625
1.05
60775312
12155062
1276.28156 12
1.05
63814 0755
12762 8151
1340.09558 55
1.05
67004 77925
13400 95585
1407.10036 425
1.05
70355 01820
14071 00364
1477.45538 220

1477.455382
1.05
73872 76910
14774 55382
1551.32815 110
1.05
77566 40755
15513 28151
1628.94555 855
1.05
81447 27790
16288 94558
1710.33928 590
1.05
85516 96425
17103 39285
1795.85624 925
1.05
89792 81245
17958 56249
1885.64906 145
1.05
94282 45305
18856 49061
1979.93151 405
1.05
98996 57570
19799 31514
2078.92808 970
1.05
103946 40445
20789 28089
2182.87449 345

2182874493
1.05
109143 72465
2182 87449 3
2292.01821 765
1.05
114600 91085
22920 18217
2406.61912 785
1.05
120330 95635
24066 19127
2526.95008 335
1.05
126347 50415
25269 50083
2653.29758 713
1.05
132664 87935
26532 97587
2786.96246 635
1.05
139298 12330
27859 62466
£2925.26058 930 Answer

What would an Annuity of £520 for-
-born 17 Years at £6 ₰ Cent. Compound Interest
amount to?

28.21288
520
56425760
14106440
£ 14670.69760 answer.

What present money will discharge a Debt of £7500 to be paid at the End of 10 Years, Rebate being made at 5 ℔ Cent. ℔ annum compound Interest?

.613913
7500
306956500
42 97391
£460 43 47 5 00 answer.

What is a yearly Rent of £65, to continue 30 Years, worth in ready Money Rebate being made at £6 ₰ Cent. ₰ Ann: compound Interest?

13.76483
65
6882415
8258898
£ 894.71395 Answer

What's the present Worth of the Reversion of a Lease of £500 ℔ annum to continue 20 Years, but not to commence till after the End of five Years, allowing the purchaser £6 ℔ Cent. Compound Int:?

Sums of this Nature must be worked as follows. First find the ℔ present Worth of the propos'd Annuity, for the given time of it's Continuance as if it were to commence immediately, then see what ~~forborn at~~ Principal, forborn at the given Interest, would in time of the Reversion amount to the aforesaid present Worth, & that Principal will be the present Worth of such Annuity in Reversion.

11.16992
500
5734960 00

£ £ £
1.33822 : 1 :: 5734.96

Ans:
1.33822) 5734.96000000 (4285.5136
535288
382080
267644
1144360
1070576
737840
669110
687300
669110
181900
133822
480780
388466
923140
868932
44208

4.21236
500
2106.18000

12.78335
500
6391.67500
2106.18000
Ans: 4285.49500

Freehold Estates

To find the present Worth of any annual Rent to continue forever, call'd Fee-Simple.

Rule

Divide the proposd Rent by the Interest of £1 for 1 Yr (which at 5 ℔ Cent: is .05 & 6 ℔ Cent. .06 as hinted before) & the Quotient is the present Value of the Estate.

Or it may be done by multiplying the Fee-Simple of £1 by the Yearly Rent propos'd.

The Fee-Simple of £1 ℔ Annum Compound Int.

at	℔ Cent. is	£
1		100.00000
2		50.00000
3		33.33333
4		25.00000
5		20.00000
6		16.66667
7		14.28571
8		12.50000
9		11.11111
10		10.00000

What is an Estate of 200 £ P Ann̄um to continue forever worth in ready Money allowing the purchaser 5 £ P Cent: P annum compound Interest?

.05	200.00	£
Ans:	4000	£

200
20
Answer 4000 £

A has the Possession of an Estate of £130 ℔ Annum to continue 20 Years; B has the Reversion of the same from that time for ever. What must A give B if he would purchase his Reversion? and what must B give A if he would buy his Possession accounting £6 ℔ Cent: Comp: Int: in each Case?

11.46992
130
Ans: £1491.08960 A's Possession

.06|130.00000
2166.6666
1491.0896
£675.567 B's Reversion

E agrees with B for an Annuity of 600 ℔ Annum to continue 25 Years to give him the present Worth of it at 6 ℔ Cent. ℔ Annum; but not having Money enough by him offers to make over to him a Freehold Estate of £12 ℔ Annum at the same Interest, What Money besides will pay his Purchase?

12.78335
600
7670.01000
200.00000
Ans: 7470.01000

.06 | 12.00
200.0

Single Fellowship

See explain'd in Whole Numbers.

Rule

Divide the whole Gain or Loss by the whole Stock, & multiply the Quotient by each man's particular Stock the several products are the respective gains of each. Six or Seven places of Decimals in the Quotient are sufficient in most cases.

Suppose A B & C trading together A puts £500 *B* £700 *& C* £1200 *their whole gain is* £36. *What share of it belongs to each?*

	£
A	500
B	700
C	1200
Tot	2400

836.0000000 (.3483333

7200

11600

9600

20000

19200

8000

7200

8000

7200

8000

7200

8000

7200

800

500

£ 174.1666500 A's Share

.3483333

700

£ 243.8333100 B's Share

3483333

1200

£ 417.9999600 C's Share

		£
A's, B's, C's	share	174.16665
		243.83331
		417.99996
	£	835.99992 Proof

Double Fellowship

Is so called when their Gains are dif=ferent not only in respect of their Stocks but in re=spect of the time of Continuance in Company; Therefore to work the Sums observe this general

Rule.

As the total sum of the Products of each Man's Money & Time,
Is to the total Gain;
So is the particular Product of each Man's money & time,
To each Mans particular Gain.

A puts into Company £525.10 for 6 Months B £382.15 for 8 Months & C £1000 for 4 Months they gained in all £286.12. How much is that for each?

A	B	C
£ 525.5	382.75	1000
6	8	4
3153.0	3062.00	4000
3062.0		
4000.0		

10215 | 1286.600000 (.125952

10215
26510
20430
60800
51075
97250
91935
53150
51075
20750
20430
320

		£
.125952	.125952	.125952
3153	3062	4000
377856	251904	503.808000 C's Gain
629760	755712	385.665024 B's Gain
125952	377856	397.126656 A's Gain
377856	385.665024	£1286.599680
397.126656		

A B. Company. Viz.
A put in the first of Jan: £59 but B could not put any Money in till the 1.st of May following; What must B then put in to have an equal share with A at the Years End?

Months	£	Months
12	59	8

12
8 | 708.0
£ 88.5 Answer

A B & C keep company; A put in the first of March 60 £ B put in the sixth of May 160 Yards of Broad Cloth, & C put in the first of June 240 Ducats: On the first of January following they accounted their Gain; of which A & B took up £456. B & C took up £431. & C & A took up £375. The Question is what was gain'd as well in the whole as a-part, what B valued a Yard of Cloth at, & what C's Ducats value was?

£
456 A & B
431 B & C
375 C & A
2 | 1262

631 Total Gain
431 B & C
200 A's Gain

£
631
375
256 B's Gain

£
631
456
175 C's Gain

£	Months	£
60	10	200
*	8	256

60 × 10 = 600
600 × 256 = 3600
3000 + 1200 = 1600
200 × 8 = 1600

16/00 { 2 | 1536 | 00 ; 8 | 768 }

96 £ ans:

£	Months	£
60	10	200
*	7	175

175 × 60 = 10500
10500 × 10 = 105000
200 × 7 = 1400

14/00 { 2 | 105000 ; 2 | 52500 }

72 £ ans:

£	Yd.
160	96 :: 1

16/0. { 2 | 96.00 ; 8 | 4.8 } .6

Ducats	£	Ducat
240	72	:: 1

24/0 { 2 | 75.00 ; 2 | 37.5 } .3125

A B & C Company & put in together £3822 A's money was in 3 Months; B's Money was in 5 Months; & C's money was in 7 Months; They gained £234 which was so divided as the ½ of A's Gain was equal to ⅓ of B's Gain & ⅓ of B's Gain equal to ¼ of C's Gain What did each Merchant gain & put in?

Sup: £

70 A's
105 B's
140 C's
} gain

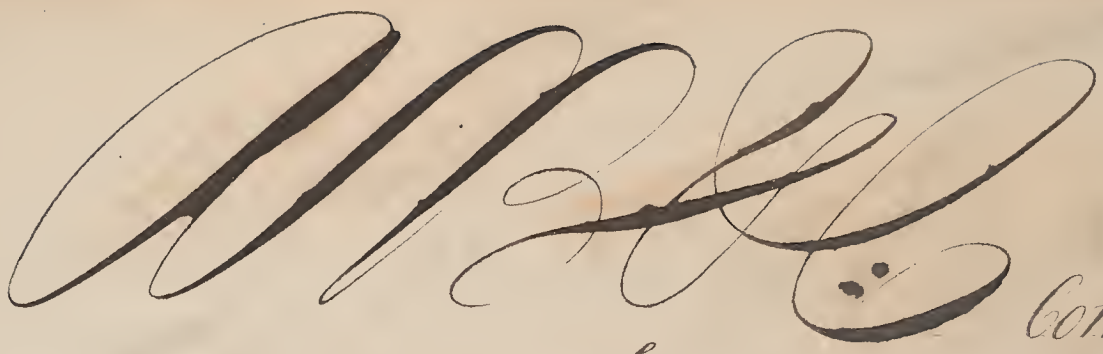
£ £ £
315 : 234 :: 70
70

315) 16380 (52 £
1575
630
630

£

52 A's
78 B's
104 C's
} true Gain

£	£	£	£
52	78	104	156
3	5	7	3
156	390	728	468 £ A put in
390	3	3	1170 £ B put in
728	1170	2184	2184 £ C put in
1274) 3822 (3			3822
3822			



Company.

A put in the 1st of January £100 & the first of May puts in £150 more & on the first of September takes out £30 the Remainder stays in till the Years End. B put in the first of January £250 & on the first of June £60 more & on the first of November £100 more which continue in till the Years End. C put in the first of Jan: £300 & on the first of April takes out £200 & on the first of August takes out £50 more the Remainder stays in till the Years End. What must each have of the gain which was £133?

	£	Months			
A's	100	4	100 / 4 / 400	250 / 4 / 1000	220 / 4 / 880
	250	4	1000		
	220	4	880	310 / 5 / 1550	410 / 2 / 820
			A's 2280		
B's	250	5	250 / 5 / 1250	1250 / 820 / B's 3620	
	310	5			
	410	2			
C's	300	3	300 / 3 / 900	100 / 4 / 400	50 / 5 / 250 / 400 / 900 / C's 1550
	100	4			
	50	5			

A's 2280
B's 3620
C's 1550
Tot: 7450

7450) 133.000 000000 (.017852
7450
58500
52150
63500
59600
39000
37250
17500
14900
2600

.017852
1550
892600
89260
17852
£ 27.678600 As
64.624240 Bs
40.702560 Cs
Gain

.017852
3620
357040
107112
53556
64.624240

.017852
2280
1428160
35704
35704
40.702560

Evolution

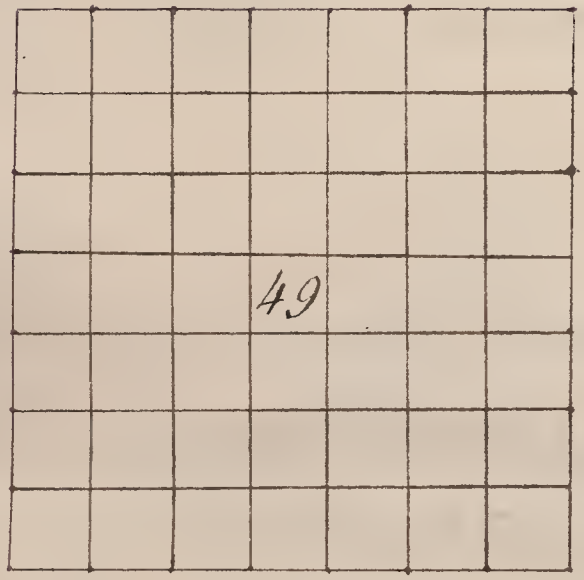
or

Extraction of Roots.

The Square Root.

The Extraction whereof consists in finding the Side of a Square Figure, or Numerically speaking it consists in finding what Number multiplied by it's self will produce y^e Num.^br given. Thus the Square Root of 25 is 5, for 5 x 5 = 25.

What a Square is may be seen by the following Table Figure which being divided every way into 7 equal parts its whole Content or Square is 49 & its Side or Root is 7.


7
49

Square Numbers are either Single or Compound.

A Single Square Number is always less than 100 & its Root is found at once by the following Table.

1	4	9	16	25	36	49	64	81	Squares
1	2	3	4	5	6	7	8	9	Roots

Suppose 96 a Square Number given whose Root is required look in the Table for the next least square Number which is 81 whose Root is 9 & the Remainder is 15.

A Compound Square Number is made by the Multiplication of 2 or more figures by themselves & always 100 as 132 which is 11 times 12; or 169 which is 13 times 13.

To find the Root of any compound Square Number as suppose 2704.

First you must distinguish it into single Squares by pla-
-cing Dots over every other figure beginning at ye right-Hand.

Thus 2704

And so many Dots as happen so many Places will the Root consist of

Secondly draving a crooked Line on the right Hand of your Number as in Division find the Root your first single Square & place it in the Quotient.

Viz 2704(5

Thirdly placing the Square of the Root found under the first single Square subtract & set down the Remainder bringing down to it the next single Square & call the Line a Resolvend.

Viz. 2704(5
25
204 Resolvend.

Fourthly draving anether crooked Line on the left hand of the said Resolvend, place beyond it the double of the Quo-
-tient, in the Manner of a Divisor.

Viz. 2704(5
25
10)204 Resolvend

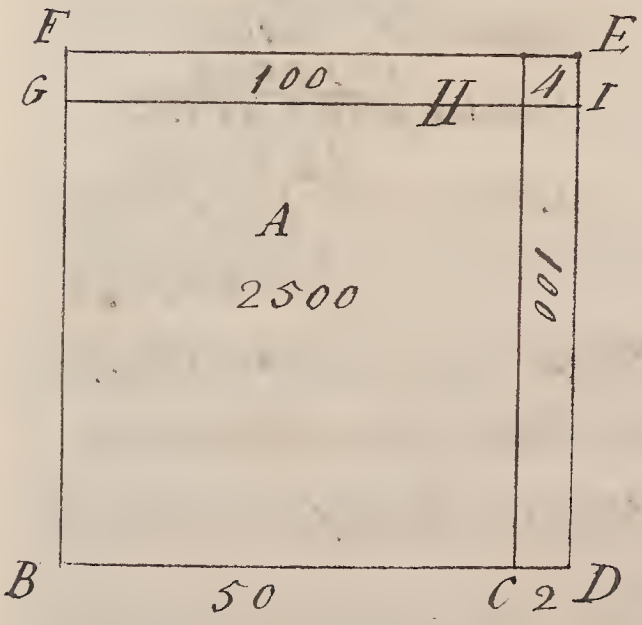
Fifthly dividing the Resolvend all but the Units place, by the said Divisor set down the number of times it goes both in the Quo-
-tient & on the right hand of the Divisor Viz 2704(52
25
102)204 Resolvend

Sixthly multiplying the whole Divisor by the Figure last plac'd in the Quotient set down the product under & subtrat it from the Resolvend.

Viz

```
2704(52
 25
102)204  Resolvend
 204
   0
```

The same Question lineally explained.



The several parts of ye Square { 2500, 100, 100, 4 }

Whole Square 2704

Parts of the Root { 50, 2 }

Whole Root 52

What's the Square Root of 119716?

```
119716(346
  9
64)297
   256
686)4116
   4116
```

What's the Square Root of 21418384?

```
2141838 4(4628
  16
86)541
   516
922)2583
   1844
9248)73984
     73984
```

What's the Square Root of 90032402916?

```
 90 03 24 02 91 6 (300054
  9
 60)000
    000
   600)32
       00
  6000)3240
       0000
 60005)324029
       300025
 60011)2400416
       2400416
```

What's the Square Root of 3216052732?

```
  32 16 05 27 3.00 00 00 (17933.356
   1
 27)221
    189
 349)3260
     3141
 3583)11952
      10749
 35863)120373
       107589
 35866.3)1278400
         1075989
 35866.65)20241100
          17933325
 35866.706)230777500
           215200236
            15577264
```

N B. If the Product happens to be more than the Resolvend you may be sure you have taken it a time too much & must therefore set a less Figure in the Root.

Secondly the Operation for finding a new Resolvend & Divisor must be repeated for every Figure placed in the Root except the first.

If you would Extract the Square Root of a Vulgar Fraction Extract the Square of the Numerator the Root thereof place for a Numerator then Extract ye Square of the Denominator the

Root of which place for a Denominator. But if the Fraction happens to be surd that is compesd of such Numbers whose Roots cannot be exactly found: Reduce it to a Decimal & then observe the Rule.

To extract the Square Root of a Decimal Fraction.

The Decimal must be made to consist of an even Number of places & then point & separate as before.

Note first if you would find the fractional parts of any Remr annex pairs of Cyphers & proceed as far as you please. Secondly if a mixt Number be given the Decimals must be even.

To prove Extrations of the Square Root.

Multiply the Root by it self (to the product add in the remainder if any) which if right will be the same with the given Number.

What's the Square Root of $\frac{16}{49}$?

ans: $\frac{4}{7}$

What's the Square Root of $\frac{256}{441}$?

256(16
1
26)156
156

441(21
4
41)241
41

ans: $\frac{16}{21}$

What's the Square Root of $\frac{17}{19}$?

19)17.00000000(.894736842(9459 ans:
152
180
171
90
76
140
133
70
57
130
114
160
152
80
76
4

81
184)847
736
1885)11136
9425
18909)171184
170181

What's the Square Root of 3161 4130?

ans:

```
3161 4130.0000 0000 (5622.6443
 25
106)661
    636
1122)2541
     2244
11242)29730
      22484
112446)724600
       674676
1124524)4992400
        4498096
11245284)43430400
         44981136
112452883)444926400
          337358649
          107567751
```

What's the Square Root of 3513?

ans:

```
3513.0000 0000 (59.2705
 25
109)1013
    981
1182)3200
     2364
11847)83600
      82929
118540)67100
       00000
1185405)67100000
        59270025
         7829975
```

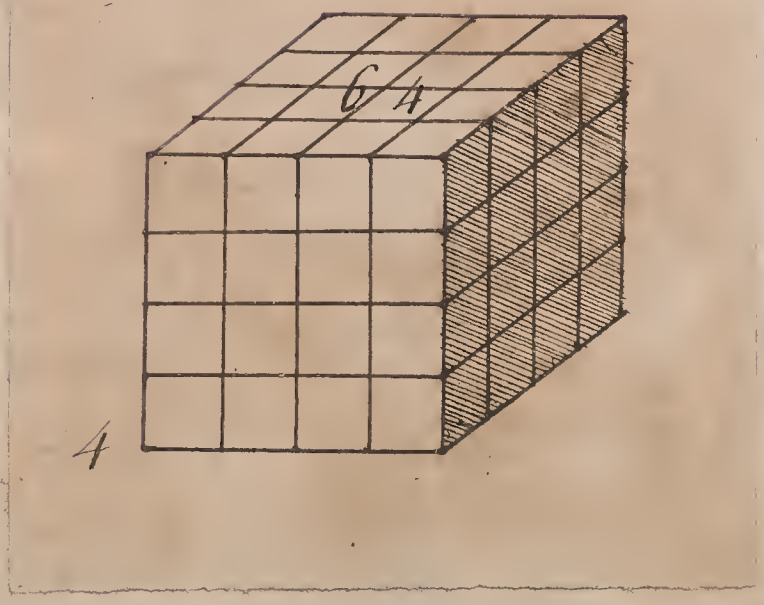
What's the Square Root of $6\frac{4}{5}$

```
 6.8000 0000 (2.6076 ans:
 4
46)280
   276
5207)40000
     36449
52146)355100
      312876
       42224
```

Cube Root

The Extraction whereof consists in finding the side of a Solid Figure whose Length Breadth & Depth are equal, or numerically speaking it consists in finding out what number multiplied twice into it's self will produce the number* thus the Cube Root of 343 is 7, for 7 × 7 = 49 & 49 × 7 = 343, the given Cube Root* given

What a Cube is may be seen by the following Figure.


6
4
4

Cube Numbers are either Single or Compound.

A Single Cube Number is always less than 1000 therefore its Root may be found at sight by the following Table, for if you involve 6 to the 3rd power it's 216 &c.

Roots	1	2	3	4	5	6	7	8	9
Squares	1	4	9	16	25	36	49	64	81
Cubes	1	8	27	64	125	216	343	512	729

A Compound Cube Number is always more than a 1000 & therefore the Root cannot be found at first sight as in Single Cube Numbers but must be proceeded with as follows.

Suppose 15625 which is a Compound Number to find the Root thereof.

You must 1.st distinguish it into Single Cubes which is done by placing Dots over every third figure beginning from the Right Hand. thus

15625

And so many Dots as happen so many places will the Root consist of.

Secondly drawing a crooked Line on the Right Hand of your Number as in Division, set down as a Quotient the Root of your first single Cube.

Thirdly placing the Cube of the Root found under the first single Cube, Subtract, & to the Remainder bring down the next single Cube which call a Resolvend. Viz. $\dot{1}\dot{5}\dot{6}2\dot{5}(2$
$\underline{8}$
7625 Resolvend

Fourthly draw a Line under the Resolvend & tripling the Square of the Root set the said triple Square under the Resolvend; so that Units in the said triple Square may stand under the place of hundrerds in the Resolvend.

Viz. $\dot{1}\dot{5}\dot{6}2\dot{5}(2$
$\underline{8}$
7625 Resolvend
12 Triple square of 2

Fifthly subscribe also the ~~the~~ triple of the Root so that Units in this may stand under the place of tens in the Resolvend. Viz. $\dot{1}\dot{5}\dot{6}2\dot{5}(2$
$\underline{8}$
7625 Resolvend
12 triple squ: of 2
6 triple of the Root

Sixthly the triple Square of the Root & triple Root being placed as directed draw a Line under them & add them together in the Order they are placed; the sum is a Divisor. Viz 15625(2

8
7625 Resolvend
12 triple square of 2
6 triple of the Root 2
126 Divisor.

Seventhly accounting all the Resolvend (except the place of Units) a Dividend seek how oft the Divisor is contain'd in it & place the Number of times in the Quotient. Viz. 15625(25

8
7625 Resolvend
12 triple Square of 2
6 triple of the Root 2
126 Divisor

Eightly draw a Line under the Divisor and multiply the triple Square by the figure last ~~produced~~ placed in the Quotient set the product so under the said triple Square that Units be under Units &c. Viz. 15625(25

8
7625 Resolvend
12 triple Square of 2
6 triple of the Root 2
126 Divisor
60 triple Square × 5

Ninthly Squaring the figure last placed in the Quotient ~~so that tens in this~~ Multiply its

Square by the triple Root & place the product so that Units in this may stand Under Units in the said triple Number. Viz.

15625(25
8
7625 Resolvend
12 triple Square of 2
6 triple of the Root 2
126 Divisor
60 triple Square ×5
150 triple Root ×5 ×5

Tenthly subscribe the Cube of the figure last placed in the Quotient so that tens in this may stand under Units in the former product.

Viz.

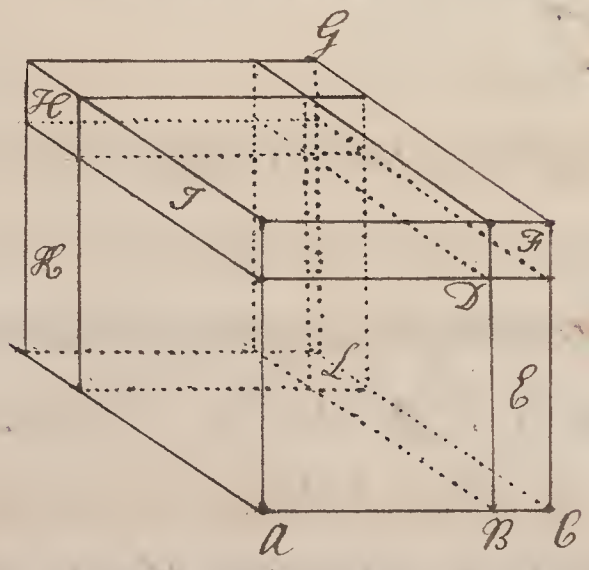
15625(25
8
7625 Resolvend
12 triple Square of 2
6 triple of the Root 2
126 Divisor
60 triple Square ×5
150 triple Root ×5 ×5
125 Cube of 5

Eleventhly then drawing a Line add the three last Numbers last placed together & subtrating the Sum (which is called the Ablatitium) from the Resolvend set down the Remainder (if any) in order underneath as in common Subtraction.

Viz. 15625 (25
8
7625 Resolvend
12 triple square of 2
6 triple of the Root 2
126 Divisor
60 triple square × 5
150 triple Root × 5 × 5
125 Cube of 5
7626 Ablatitium

Note if the given Number has more places the next single Cube must be brought down to the last Remainder, for a new Resolvend & the work of the 4.th 5.th 6.th 7.th 8.th 9.th 10.th 11.th Rules must be repeated as often as you so form a new Resolvend; & if the Ablatitium is greater than the Resolvend the Work is false which must be rectify'd by placing a lesser figure in the Quotient.

A Lineal Explanation.



15625	
8000	Cube A D
7625	Remainder or Resolvend
1200	Bases of the parallelepipedes I K E
6	Height of parallelepipedes F H L
1260	Divisor
6000	Content of parallelepipedes I K E
1500	Content of parallelepipedes F H L
125	Content of parallelepipedes G
7625	Total or Ablatitium

To prove Evolutions or Extractions of the Cube Root.

Rule.

Multiply the Root found by itself the product multiply'd again by the Root to which adding the Remainder if any which if done right will produce the exact Cube.

To Extract the Cube Root of a Vulgar Fraction

Which if commensurable Extract the Cube Root of the Numerator for the Numerator of the Root & the Cube Root of the Denominator for the Denominator of the Root.

But if incommensurable reduce it to a Decimal & extract the Cube Root thereof.

What's the Cube Root of 262144?

$$
\begin{array}{rl}
 & 262144\,(64 \text{ Ans.} \\
6 = a & 216 = a^3 \\
\hline
 & 46144 \text{ Resolvend} \\
 & 108 = 3a^2 \\
 & 18 = 3a \\
\hline
4 = b & 1098 \text{ Divisor} \\
 & 432 = 3a^2b \\
 & 288 = 3ab^2 \\
 & 64 = b^3 \\
\hline
 & 46144
\end{array}
$$

64
64
256
384
4096
64
16384
245 76
262144 Proof.

What's the Cube Root of 4862 7125?

$$
\begin{array}{rl}
 & 4862\,7125\,(364 \text{ Ans} \\
3 = a & 27 = a^3 \\
\hline
 & 21627 \text{ Resolvend} \\
 & 27 = 3a^2 \\
 & 0 = 3a \\
\hline
6 = b & 279 \text{ Divisor} \\
 & 162 = 3a^2b \\
 & 324 = 3ab^2 \\
 & 216 = b^3 \\
\hline
 & 19656 \text{ Ablatitium} \\
\hline
 & 1971125 \text{ Resolvend} \\
36 = a & 3888 = 3a^2 \\
 & 108 = 3a \\
\hline
4 = b & 38988 \text{ Divisor} \\
 & 15552 = 3a^2b \\
 & 1728 = 3ab^2 \\
 & 64 = b^3 \\
\hline
 & 1572544 \text{ Ablatitium} \\
\hline
 & 398581 \text{ Resolvend}
\end{array}
$$

364
364
1456
2184
1092
132496
364
529984
794976
397488
398581
4862 7125 Proof

What's the Cube Root of 13798. to three Decimal Places in the Root?

$2 = a$ — 13798.000000000 (23.984 Ans:

8 $= a^3$

5798 = 1.st Resolvend

12 $= 3a^2$

$3 = b$ — 6 $= 3a$

126 Divisor 1.st

36 $= 3a^2b$

54 $= 3ab^2$

27 $= b^3$

4167 Ablatitium 1.st

$23 = a$ — 1631000 Resolvend 2.nd

1587 $= 3a^2$

$9 = b$ — 69 $= 3a$

15939 Divisor 2.nd

14283 $= 3a^2b$

5589 $= 3ab^2$

729 $= b^3$

1484919 Ablatitium 2.nd

$23.9 = a$ — 146081000 Resolvend 3.rd

171363 $= 3a^2$

$8 = b$ — 717 $= 3a$

171447 Divisor 3.rd

137094 $= 3a^2b$

45888 $= 3ab^2$

512 $= b^3$

137549792 ablatitium 3.rd

$23.98 = a$ — 8531208000 Resolvend 4.th

1725212 $= 3a^2$

$4 = b$ — 7194 $= 3a$

172519314 Divisor 4.th

69004848 $= 3a^2b$

115104 $= 3ab^2$

64 $= b^3$

6901635904 Ablatitium 4.th

16295720096 Resolvend 5.th

23.984
23.984

95936
191872
215856
71952
47968

575.23 22256
23.984

2300929024
46018580480
5177090304
172569676800
11504645120
1629572096

13798.000000 00000

Proof.

What's the Cube Root of $5\frac{16}{19}$?

19)16.000000000(5.842105263(1.801 Ans:
152 $1=a$ $1=a^3$

80 — 4842 Resolvend
76 — 3 $=3a^2$
40 — 3 $=3a$
38 — $8=b$ 33 Divisor
20 — 24 $=3a^2b$
19 — 192 $=3ab^2$
100 — 512 $=b^3$
95 — 4032 Ablatitium
50 — $180=a$ 10105263 Resolvend
38 — 97200 $=3a^2$
120 — 540 $=3a$
114 — $1=b$ 972540 Divisor
60 — 97200 $=3a^2b$
57 — 540 $=3ab^2$
3 — 1 $=b^3$

9725401 Ablatitium
379862 Resolvend

1.801
1.801
1801
144080
1801
3.243601
1.801
3243601
259488080
3243601
379862
5842105263 Proof

What's the Cube Root of $\frac{24}{37}$?

37)24.000000000(.648648648(.865 Answer

222
180
148
320
296
240
222
180
148
320
296
24

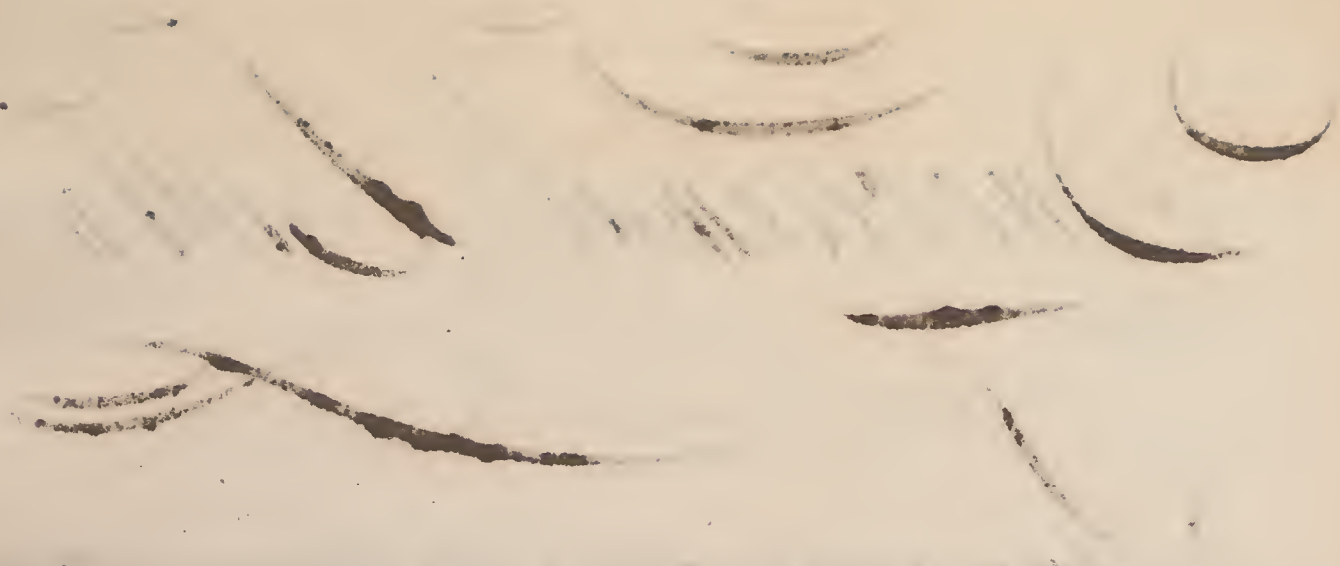
8=a $512a^3$
136648 = Resolvend
$192 = 3a^2$
$24 = 3a$
6=b 1944 = Divisor
$1152 = 3a^2b$
$864 = 3ab^2$
$216 = b^3$
124056 = Ablatitium
86=a 12592648 = Resolvend
$22188 = 3a^2$
$258 = 3a$
5=b 222138 = Divisor
$110940 = 3a^2b$
$6450 = 3ab^2$
$125 = b^3$
111586 25 ablatitium
1434023 Resolvend

.865
.865
4325
5190
6920
.748225
.865
3741125
4489350
5985800
1434023
6486486 48 Proof.

Duodecimal Arithmetic

This is what is called Crofs Multiplication amongst Workmen & Artificers who generally cast up all their measured Work by this Way therefore you are to observe the following Table.

Factors	Feet	Inches	Parts
Feet	are Feet	are Inches ÷ by 12 are Feet	are parts ÷ by 12 are Inches
Inches	are Inches ÷ by 12 are Feet	are parts ÷ by 12 are Inches	are seconds ÷ by 12 are parts
Parts	are Parts ÷ by 12 are Inches	are seconds ÷ by 12 are parts	are Thirds ÷ by 12 are seconds



1.st Feet & Inches by Feet & Inches.

Let 7 Feet 9 Inches be multiplyed by 5 Feet 6 Inches?

Feet	In:
7	9
5	6
38	9 Parts
3	10 6
42	7 6

Let 73 Feet 7 Inches be multiplied by 9 Feet 9 Inches?

Feet	In:
73	7
9	9
657	0 Parts
36	9 6
18	4 9
4	6 0
0	9 0
717	5 3

Let 97 Feet 11 Inches be multiplied by 8 Feet 10 Inches.

Feet	In:	
97	11	
8	10	
776	0	Parts
48	11	6
32	7	8
4	0	0
2	0	0
1	4	0
864	11	2 ans:

Let 69 Feet 9 Inches be multiply'd by 19 Feet 7 Inches.

Feet	In:	
69	9	
19	7	
1311	0	
23	3	Parts
17	5	3
9	6	0
4	9	0
1365	11	3 ans:

Let 85 Feet 5 Inches be multiply'd by 37 Feet 8 Inches.

Feet	In.	
85	5	
37	8	
595	0	
255	0	Parts
42	8	6
14	2	10
12	4	0
3	1	0
3217	4	4 ans.

Let 238 Feet 3 Inches be multiplyed by 48 Feet 11 Inches.

Feet	In.	
238	3	
48	11	
1904	0	
952	0	Parts
119	1	6
59	6	9
39	8	6
12	0	0
11654	4	9 Answer

Multiply 257 Feet 9 Inches by 54 Feet 11 Inches?

Feet	Inches	
257	9	
54	11	
1028	0	
1285	0	Parts
128	10	6
64	5	3
42	11	6
27	0	0
13	6	0
14154	9	3 Ans:

2.nd Feet Inches & Parts into Feet Inches & Parts.

Let 9 Feet 7 Inches 9 Parts be multiply'd by 4 Feet 5 Inches 3 Parts

Feet	Inches	Parts	
9	7	9	
4	5	3	
38	7	0	Seconds
4	0	2	9 Thirds
	2	4	11 3
42	9	7	8 3 Ans:

Let 34 Feet 9 Inches 5 parts be multiplyd by 5 feet 8 In: 7 parts.

Feet	Inches	Parts			
34	9	5			
5	8	7			
170	0	0			Seconds
17	4	8	6		
5	9	6	10		Thirds
1	5	4	8	6	
0	2	10	9	5	
2	6	0	0	0	
1	3	0	0	0	
0	1	8	0	0	
0	0	5	0	0	
198	9	7	9	11	Ans:

Let 219 Feet 8 Inches 10 parts be multiplied by 37 Feet 5 Inches 11 parts.

Feet	Inches	parts			
219	8	10			
37	5	11			
1533	0	0			
657	0	0			seconds
73	2	11	4		
18	3	8	10		
9	1	10	5		Thirds
4	6	11	2	6	
3	0	7	5	8	
18	6	0	0	0	
6	2	0	0	0	
2	0	8	0	0	
0	6	2	0	0	
8238	6	11	3	2	Ans:

A Table of the Decimal Parts of a Foot.

Inches	Decimals	Inch:	Decimals	Inch:	Decimals
1/4	.0208333	1/4	.3541666	1/4	.6875
1/2	.0416666	1/2	.375	1/2	.708333
3/4	.0625	3/4	.3958333	3/4	.7291666
1	.0833333	5	.4166666	9	.75
1/4	.104166	1/4	.4375	1/4	.7708333
1/2	.125	1/2	.458333	1/2	.7916666
3/4	.145833	3/4	.479166	3/4	.8125
2	.166666	6	.5	10	.8333333
1/4	.1875	1/4	.520833	1/4	.8541666
1/2	.208333	1/2	.541666	1/2	.875
3/4	.229166	3/4	.5625	3/4	.895833
3	.25	7	.583333	11	.916666
1/4	.270833	1/4	.6041666	1/4	.9375
1/2	.291666	1/2	.625	1/2	.958333
3/4	.3125	3/4	.6458333	3/4	.979166
4	.333333	8	.6666666	12	.———

Suppose a Plane be 9 feet 10 Inches ¾ in Length & 8 Feet 8¼ Inches in Breadth; Quære the Content or Area?

Feet

9.895833
86875

19479165
69270831
79166664
59374998
79166664

Feet 85.970049 1875
12
Inches 11.640590 2500
12
Parts 7.687083 0000
12
Sec: 8.244996 0000
12
Thir: 2.939972 0000

Feet Inches Parts

9 ′ 10 ′ 9
8 ′ 8 ′ 3

79 ′ 2 ′ 0 Seconds
6 ′ 7 ′ 2 ′ 0 Thirds
0 ′ 2 ′ 5 ′ 8 ′ 3

Proof 85 ′ 11 ′ 7 ′ 8 ′ 3

	Feet	Inches	Parts	
	21	2	0	
	11	10	6	
	231	0	0	
	10	7	0	
	7	0	8	
	0	10	7	
	1	10	0	
	251	4	3	
	7	3	0	
	1757	0	0	
Sec.	62	10	0	9
	1	9	0	0
	0	7	0	0
	0	1	9	0
Proof	1822	3	9	9

What Number of solid Feet is in a Cellar 21 Feet 2 Inches long, 11 Feet 10 Inches ½ broad & 7 Feet 3 Inches deep?

Feet

21.166666
11.875

105833330
148166662
169333328
21166666
21166666

251.354158750

7.25

1256770793750
5027083175000
1759479111250

Feet 1822.317650937500

12

Inches 3.811812500000

12

Parts 9.741735000000

12

Sec: 8.900820000000

Feet Inches Parts Sec:

Ans: 1822 ; 3 ; 9 ; 9

The Use of the Square Root.

Problem 1.st

To find a Mean proportional between any two given Numbers.

Rule.

Multiply the given Numbers together & from their Product extract the Square Root which will be the Mean proportional sought.

Let the given Numbers be 12 & 48 What's the Mean proportional between them?

48
12
---
576 (24 Answer
4
---
44) 176
176

Problem. 2.nd

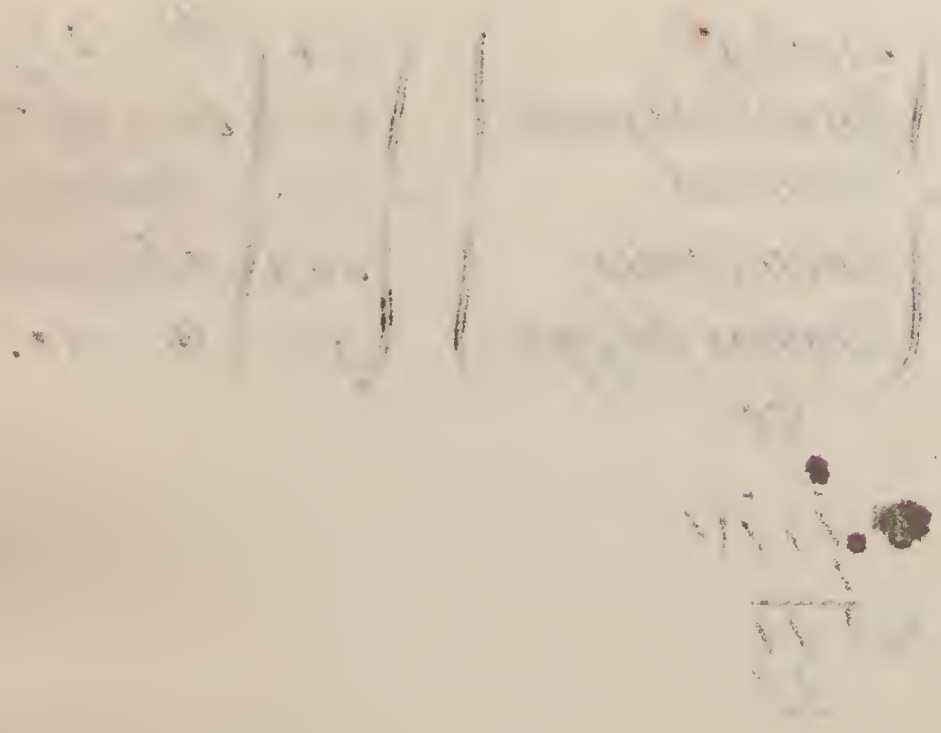
To find the Side of a Square whose Area shall be equal to any given Superficies.

Rule.

Extract the Square Root from the Content of any given Superficies which Root will be the Side of the Square sought adequate thereto.

Let the Content of a { Triangle, Parallelogram, Rhombus, Rhomboides, Regular Polygon &c } be { 144, 468, 810, 589, 964 } What's the Side of a Square adequate thereto?

1 44 (12
1
22) 44
44



468.000000 (21.633

4

41) 68

41

426) 2700

2556

4323) 14400

12969

43263) 143100

129789

13311

810.000000 (28.4604

4

18) 418

381

564) 2600

2256

5686) 34400

34116

569204) 2840000

2276816

563184

589.000000 (24.269

4

44) 189

176

482) 1300

964

1846) 33600

29076

18529) 452400

436761

15639

964.000000 (31.048

9

61) 64

61

6204) 30000

24816

62088) 518400

496704

21696

Problem. 3.rd

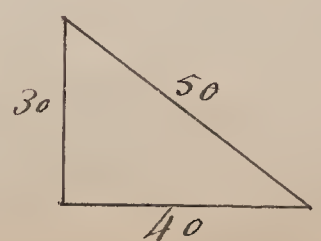
Having any two sides of a rectangled Triangle to find the third side.

Rule

If you have the two shortest sides given to find the Hypothenuse or longest side: From the Sum of the Squares of the two sides extract the Square Root which is the Length of the Hypothenuse.

Let the Base or Breadth of a Ditch be 40 Yards & the perpendicular or Altitude of the Wall be 30 Yards what Length will the Hypothenuse or scaling Ladder be?

```
 30   40
 30   40
---  ----
900  1600
      900   yds
     ----
     2500 | 50 ans:
     25
     ---
      00
```



Problem 4.th

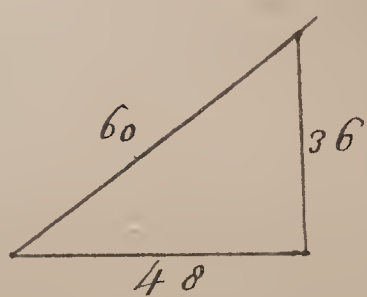
There is a Tower about which is a Moat 48 Feet wide & a scaling Ladder 60 Feet long which will reach from the outside of the Moat to the top of a Wall within the said Moat. Demand the altitude of the said Wall above the Water.

Rule.

From the Hypothenuse squar'd deduct the Base squar'd the square Root of which Remainder is the altitude or perpendicular required.

given { Base 48 Feet / Hypothenuse 60 Feet } to find the altitude?

48	60
48	60
384	3600
192	2304
2304	1296 (36 Feet
	9
	66) 396
	396



Problem 5.th

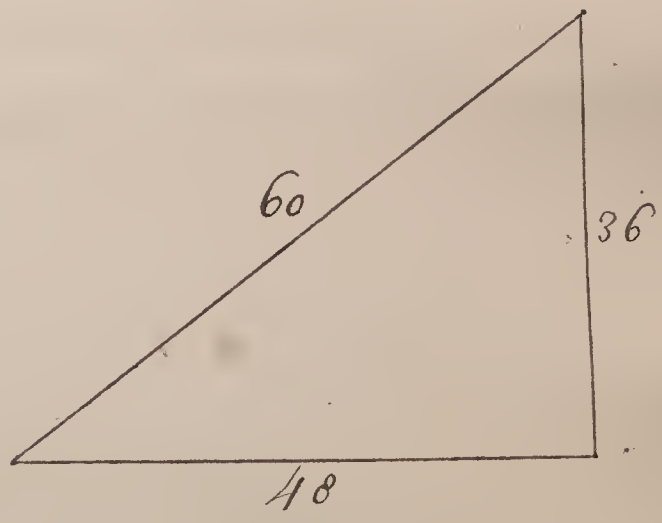
If the Hypothenuse & perpendicular were gi-ven to find the Base.

Rule.

From the Square of the Hypothenuse deduct the Square of the perpendicular the Square Root of which Remainder is the Base requir'd.

given { Hypothenuse 60 feet / perpendicular 36 feet } to find the Base.

```
  60        36
  60        36
------    ------
3600       216
1296 Feet  108
------    ------
2304 | 48  1296
  16
------
88 | 704
     704
    ---
```



A Company of men drinking together the Reckoning came to 6 S o d ¼ I Demand how many were in Company & how much each man spent?

S d
6 : 0 ¼
12
72
4
289 (17) 289 (4 | 17 (1
1 17 d 4 ¼
27) 189 119
189 119

A Company of Men Drinking together the Reckoning came to 5 S. Demand how many were in Company and how much each man spent?

S
5
12
60
4
240 (15) 240 (4 | 16
1 15 4 d
25) 140 90
125 90
15

The Use of the Cube Root.

The principal useful Applications whereof are to find out a Proportion between like Solids as Globes Cylinders & Cubes &c.

Problem. 1.st

To find the side of a Cube that shall be equal in Solidity to any given Solid as a Globe, Cylinder, Prism, Cone or such like.

Rule

Extract the Cube Root of the given Solid Content of any solid body & it will give the Side of the Cube required.

Let the solid Content of a { Globe / Cylinder / Prism / Cone } be { 4188.8 Inches / 40.34 feet / 14.27 feet / 21.07 feet } To find the side of a Cube equal thereto.

4188.800000(16.09

1=a 1 $=a^3$

3188

3 $=3a^2$

3 $=3a$

6=b 33

18 $=3a^2b$

108 $=3ab^2$

216 $=b^3$

3096

92800000

160=a 76800 $=3a^2$

480 $=3a$

9=b 768440

691200 $=3a^2b$

38880 $=3ab^2$

729 $=b^3$

69509529

23290471

16.09

16.09

14481

96540

1609

258.8881

1609

23299929

155332860

2588881

23290471

4188.800000 Proof

40.340000(3.42

3=a 27 $=a^3$

13340

27 $=3a^2$

9 $=3a$

4=b 279

108 $=3a^2b$

144 $=3ab^2$

64 $=b^3$

12304

34=a 1036000

3468 $=3a^2$

102 $=3a$

2=b 34782

6936 $=3a^2b$

408 $=3ab^2$

8 $=b^3$

6976 88

338312

3.42

3.42

684

1368

1026

11.6964

3.42

23 3928

467856

350892

338312

40.340000 Proof

14.270000(242

2 = a 8 = a^3

6270

12 = $3a^2$

6 = $3a$

4 = b 126

48 = $3a^2b$

96 = $3ab^2$

64 = b^3

5884

24 = a 446000

1728 = $3a^2$

72 = $3a$

2 = b 17352

3456 = $3a^2b$

288 = $3ab^2$

8 = b^3

348488

97512

242
242
484
968
484
58564
242
117128
234256
117128
97512
14.270000

Proof

21.070000(276

2 = a 8 = a^3

13070

12 = $3a^2$

6 = $3a$

7 = b 126

84 = $3a^2b$

294 = $3ab^2$

343 = b^3

11683

27 = a 1387000

2187 = $3a^2$

81 = $3a$

6 = b 21951

13122 = $3a^2b$

2916 = $3ab^2$

216 = b^3

1341576

45424

276
276
1656
1932
552
76176
276
457056
533232
152352
45424
21.070000

Proof

Problem 2.nd

Having the Diameter & Weight of a Bullet to find the Weight of another Bullet whose Diameter is given.

Rule.

As the Cube of the Given Bullets Diameter
Is to its Solidity or Weight
So is the Cube of the Diameter of any other Bullet
To its Weight or Solidity.

If a Bullet of Brass of 8 Inches Diameter weigh 72 lb What shall a Bullet ~~weigh~~ of Brass weigh whose Diameter is 4 Inches?

8	4
8	4
64	16
8	4
512	64

512 : 72 :: 64
72
128
448
512) 4608 (9 lb Ans:
4608

Problem 3.rd

The Side or Root of a Cube being given to find the side of another Cube that shall be double, treble, quadruple &c. or quarter, half, & three quarters, in Quantity to the given Cube.

Rule

Cube your side given which multiplyed by 2, 3 4 &c. And the Cube Root of the Product is the Side sought.

Suppose a Cubical Vessel whose Side is 12 Inches & it is required to find the Side of another Vessel which shall contain 3 times as much?

12
12

144
12

1728
3

5184. 000 000 000 (17.306 Ans: Inches

5184.000000000 (17.306 Ans.

1 = a 1 = a^3

4184

3 = $3a^2$

3 = $3a$

7 = b 33

21 = $3a^2b$

147 = $3ab^2$

343 = b^3

4913

17 = a 271000

867 = $3a^2$

51 = $3a$

3 = b 8721

2601 = $3a^2b$

459 = $3ab^2$

27 = b^3

264717

1730 = a 6283000000

8978700 = $3a^2$

5190 = $3a$

6 = b 89792190

53872200 = $3a^2b$

186840 = $3ab^2$

216 = b^3

5389088616

89391384

Proof

17.306
17.306
103836
519180
121142
17306
299.497636
17.306
1796985816
898492908
2096483452
299497636
89391384
5184.000000000

It is requir'd to find the Side of a Cubical Vef=
=sel that shall contain ¼ as much as another
Cubical Vefsel whose Side is 20 Inches?

20
20
400
20
4 | 8000

2000.000000000 (12.599 Answer.

1=a 1 $= a^3$
1000
3 $= 3a^2$
3 $= 3a$
2=b 33
6 $= 3a^2b$
12 $= 3ab^2$
8 $= b^3$
728
12=a 272000
432 $= 3a^2$
36 $= 3a$
5=b 4356
2160 $= 3a^2b$
900 $= 3ab^2$
125 $= b^3$
225125
46875000

125 = a 46875000

46875 = $3a^2$

375 = $3a$

9 = b 469125

421875 = $3a^2b$

30375 = $3ab^2$

729 = b^3

42491979

1259 = a 4383021000

4755243 = $3a^2$

3777 = $3a$

9 = b 47556207

427971187 = $3a^2b$

3059937 = $3ab^2$

729 = b^3

4282778799

1002422 01

12.599

12.599

113391

113391

62995

151188

158.734801

12.599

1428613209

1428613209

793674005

19048176 12

1002422 01

2000.000000000

Proof

Problem 4.th

Between two given Numbers to find two mean proportionals

Rule

Multiply the less Extream by the Cube Root of the Quotient of the greater Extream divided by the less the Product is the lesser of the two Mean Proportionals which multiplyed by the said Cube Root gives the greater Mean sought.

Suppose two Proportionals betwixt 6 & 162 were to be sought What are they?

$6 \overline{)162}$

$27 (3$

$3 = y \quad 27 = a^3$

0

$6 \quad 18$

$3 \quad 3$

$18 \quad 54$

$6 . 18 . 54 . 162$

Problem 5.th

The Concave Diameter of 2 Guns being known together with the Quantity of Gun-powder sufficient to charge one to find what will be sufficient to charge the other.

{ As the Cube of that Diameter whose Quantity is given
Is to the Quantity of Gunpowder given
so is the Cube of the Diameter whose Quantity is requir'd
To it's Quantity of Gun-powder required.

If .43 of a lb of Gun-powder be sufficient to charge a Gun whose Concave Diameter is 1.5 Inch how much Gun-Powder will suffice to charge a Gun whose Diameter is 7 Inches?

1.5	7
1.5	7
2.25	49
1.5	7
3.375	343

3.375 : .43 :: 343

43

1029

1372

3.375) 147.4900 (43.7 lb ans:

13500

12490

10125

23650

23625

25

Problem 6.th

The Concave Diameters of two Guns being given and the Quantity of a weaker Sort of Gun-Powder sufficient to charge one of them to find how much Gun-Powder of a stronger Sort (the Proportion of the Strength & Weakness of the Gun-Powder being also given) will be sufficient to charge the other Gun.

First by Reciprocal Proportion find how much of the stronger Sort of Gun-Powder will be equivalent in Strength with the given Quantity of the weaker Sort the work by Direct Proportion as in the preceding Problem.

If 43 lb of Gun-Powder be sufficient to charge a Gun whose Concave Diameter is 1.5 Inch how much Gun-Powder of a Stronger Sort in the Proportion of 5 to 2 will suffice to charge a Gun whose Concave Diameter is 7 Inches?

2 : 43 :: 5

2

5 | 86

1.5 7

1.5 7

2.25 49

1.5 7

3.375 343

3.375 : 172 :: 343

172

686

2401

343

3.375) 58996.00 (17.48 Answer

3375

25246

23625

16210

13500

27100

27000

100

lb